

**Wetland Mitigation and Corridor Revegetation Site Monitoring for FAP 658  
(IL 29), Sangamon County, Illinois – 2002**

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**Introduction**

Wetland replacement activity has been initiated along the recently constructed section of Illinois Route 29 in Sangamon County, Illinois. The legal location of the site is SE/4 of NW/4 of Sec. 33, T 17 N, R 5 W (Athens, IL Quad). The wetland replacement site is located in a former agricultural field classified as prior converted wetland by the NRCS. The mitigation site assessment for this area suggested that floodplain forest would be the most likely development for this site (Plocher and Tessene 1995).

Field monitoring of this area began in 2000 and will continue for five years, as requested by the Illinois Department of Transportation. As of the 2000 field season, only Area B had been planted and therefore was the only area included in the first years report. This area was planted with a wetland grass seeding (*Elymus canadensis*, *Elymus virginicus*, *Spartina pectinata* and *Calamagrostis canadensis*) and with woody hydrophytic vegetation (*Quercus palustris*, *Quercus bicolor*, *Betula nigra*, *Fraxinus pennsylvanica* and *Carya illinoensis*). Monitoring of Area A was initiated in 2001 after planting was completed. The wetland compensation plan was modified for this area. Area A will be monitored as an emergent community (Brooks 2001). Only herbaceous vegetation was planted in this area. Emergent herbs planted in Area A were *Asclepias incarnata*, *Leersia oryzoides*, *Eupatorium maculatum*, *Spartina pectinata*, and *Calamagrostis canadensis*. Project goals, objectives, and performance criteria are included in this report, as are monitoring methods, monitoring results, summary information and recommendations.

**Project Goals, Objectives and Performance Criteria**

Proposed goals and objectives for the wetland mitigation project are based on information contained in the original IDOT project request (Brooks 2000) and in the modified project request (Brooks 2001). Performance criteria are based on those specified in the *Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987) and *Guidelines for Developing Mitigation Proposals* (USACOE 1993). Each goal should be attained by the end of the five year monitoring period. Project goals, objectives and performance criteria are listed below.

### **Constructed Wetland Site**

**Project Goal #1:** At the end of the five year monitoring period both created wetland communities should be jurisdictional wetlands as defined by current federal standards.

**Objective:** The created wetland should comprise 2.43 hectares (6.0 acres) of jurisdictional wetland.

**Performance Criteria:** The entire created wetland should satisfy the three criteria of the federal wetland definition: dominant hydrophytic vegetation, hydric soils and wetland hydrology.

- A. Predominance of Hydrophytic Vegetation – More than 50% of the dominant plant species must be hydrophytic.
- B. Presence of Hydric Soils – Hydric soil characteristics should be present, or conditions favorable for hydric soil formation should persist at this site.
- C. Presence of Wetland Hydrology – The compensation area must be either permanently or periodically inundated at average depths less than 2 m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season.

**Project Goal #2:** In Area B, a floodplain forest wetland community will be created.

**Objective:** Planting the area with hydrophytic tree species should compensate for the loss of previously altered wetlands.

**Performance Criteria:** Seventy-five percent of the planted trees should be in a live and healthy condition each year for five years.

**Project Goal #3:** In Area A, a native, non-weedy, emergent wetland community will be created.

**Objective:** Planting the area with high quality native emergent vegetation should reduce the pressures from successional, non-native, weedy species.

**Performance Criteria:** In Area A, at least 90% of the plant species present should be non-weedy, native, perennial and annual species, and none of the dominant plant species may be non-native or weedy species, such as cattails, sandbar willow or reed canary grass.

### **Methods**

Monitoring is performed on two areas of the constructed wetland site. The monitoring for Area B, consisting of wetland determinations and tree survivability surveys, began in 2000 and will continue for five years. Herbaceous vegetation in Area A was monitored for the first time in 2001, after the area had been fully planted. Illinois Natural History Survey (INHS) personnel will monitor the biological parameters and Illinois State Geological Survey (ISGS) personnel will monitor hydrology. Yearly tree surveys in Area B and herbaceous sampling in Area A will

be submitted in yearly monitoring reports submitted to the Illinois Department of Transportation on the status of the created wetland site. The likelihood of meeting the proposed goals and performance criteria will also be addressed. If, at any time during the monitoring period, it appears that the goals/performance criteria will not be met at the end of the five-year monitoring period, written management recommendations will be made to IDOT in an effort to correct any problems.

### **Floristic Quality Index**

For both sites to be monitored, a complete list of all spontaneous (not planted) plant species found in the area will be recorded and the Floristic Quality Index will be calculated (Taft *et al.* 1997). The Floristic Quality Index will be calculated both with and without the inclusion of planted species. This index provides a measure of the floristic integrity or level of disturbance of a site. Each plant species is assigned a rating between 0 and 10 (the Coefficient of Conservatism) that is a subjective indicator of how likely a plant may be found on an undisturbed site in a natural plant community. A plant species that has a low Coefficient of Conservatism (C) is common and is likely to tolerate disturbed conditions; a species with a high C is relatively rare and is likely to require specific, undisturbed habitats. Species not identified to species level are not rated and are not included in the calculations.

To calculate the Floristic Quality Index (FQI), first compute the mean C value (also known as mean rated quality),  $mCv = \sum C/N$ , where  $\sum C$  represents the sum of the numerical ratings (C) for all species recorded for a site, and N represents the number of plants on the site. The C value for each species is shown in the species list for the site. Species not native to Illinois (indicated by \* in the species list for each site) are not included in calculations. The FQI for each site is determined by multiplying the mean C value times the square root of N [ $mCv (\sqrt{N})$ ]. An Index score below 10 suggests a site of low natural quality; below 5, a highly disturbed site. An FQI value of 20 or more suggests that a site has evidence of native character and may be considered an environmental asset.

### **Project Goal #1**

A wetland delineation will be completed yearly for both wetland community types at this creation site. Since accurate boundaries may not be clear until several years of data have been gathered, wetlands will be marked on an aerial photograph only at the end of the five-year monitoring period. In addition, permanent photo stations have been established in each wetland restoration area and photos will be taken annually in order to help monitor changes in the vegetation. Photo stations will be marked on the aerial photograph.

A. Predominance of Hydrophytic Vegetation – The method for determining dominant hydrophytic vegetation is described in Environmental Laboratory (1987) and Federal Interagency Committee for Wetland Delineation (1989). This method is based on aerial coverage estimates for individual plant species. Each of the dominant plant species is then assigned a wetland indicator status rating (Reed 1988). Any plant rated facultative or wetter (i.e., FAC, FAC+, FACW-, FACW, FACW+ and OBL) is considered hydrophytic. A predominance of hydrophytic vegetation in the wetland plant community exists if greater than 50% of the dominant species

present are hydrophytic. Planted species were not included in the percentage of dominant hydrophytic vegetation.

In Area A, dominant hydrophytic vegetation will be determined each year based on results of systematic plant sampling. Transects have been established perpendicular to the adjacent field beginning at 15 m from the north end of Area A and continuing every 30 m afterwards. Quadrats (0.25 m<sup>2</sup>) are to be placed at 4.5 m intervals along each transect so that each planting zone would have equal opportunity to be sampled. A total of 12 transects and 35 quadrats will be sampled in Area A. Cover of all species in each plot are assigned a cover class (Table 1) (Daubenmire 1959). Frequency (proportion of quadrats in which a species occurred) and average cover (calculated using midpoints for each cover class) will be used to compute relative frequency (frequency of a species relative to total observations) and relative cover (cover relative to total observed cover), respectively. These two relative values are added to determine the importance value for each species sampled. Importance values will be used to determine dominant species. "Dominant species are the most abundant plant species (when ranked in descending order of abundance and cumulatively totaled) that immediately exceed 50% of the total dominance measure for the stratum, plus any additional species comprising 20% or more of the total dominance measure for the stratum" (FICWD 1989; Tiner 1999).

**Table 1. Cover classes used in vegetation sampling**

Cover Class	Range of Cover (%)	Midpoint of Range (%)
1	0-5	3.0
2	5-25	15.0
3	25-50	37.5
4	50-75	62.5
5	75-95	85.0
6	95-100	97.5
(Daubenmire 1959)		

B. Presence of Hydric Soils – Soils will be examined and described annually. A soil core collected from the same general area of the mitigation site will be examined for the presence of redoximorphic features. A detailed profile description of the soil using Munsell color charts to record soil colors will be included. Soil texture and structure will also be recorded. Hydric soils may develop slowly and characteristics may not be apparent during the first several years after project construction. In the absence of hydric soil indicators at that time, hydrologic data could be used as corroborative evidence that conditions favorable for hydric soil formation are present at the site.

C. Presence of Wetland Hydrology – The ISGS installed a surface-water data logger and shallow monitoring wells within Area B and began water-level monitoring activities in September 2000. Hydrology within Area A was not monitored for the 2001 growing season. In Fall 2001, the ISGS began monitoring Area A with a surface-water data logger and shallow

monitoring wells. ISGS personnel will measure water levels monthly. In addition, the site will be surveyed annually for field indicators of wetland hydrology.

### **Project Goal #2**

Tree survivorship will be assessed, in Area B, each year for a five year monitoring period. Every tree will be located, identified and determined to be alive or dead. In Area B, a total of 544 trees were recorded in 2000. These trees included *Quercus palustris* (119), *Quercus bicolor* (106), *Betula nigra* (102), *Fraxinus pennsylvanica* (103) and *Carya illinoensis* (114). Some planting to replace dead trees was done between the 2000 and 2001 with six *Betula nigra*, eight *Fraxinus pennsylvanica*, and four *Quercus bicolor* added to the site. Total number of *Carya illinoensis* and *Quercus palustris* was reduced by five and six, respectively.

### **Project Goal #3**

In Area A, a complete species list will be compiled each year and species will be recorded as native or non-native and as weedy or non-weedy. Nativity of plants was determined by consulting Mohlenbrock (1986). Weedy species, for the purposes of this report, are defined as all non-native species and any native species assigned a Coefficient of Conservatism of 0 or 1. Species given a C value of 0-1 correspond to Grime's ruderal species (Grime 1974; Grime *et al.* 1988) which include species adapted to frequent or severe disturbances (Taft *et al.* 1997).

## **Results**

**Floristic Quality Index** The Floristic Quality Index was calculated in two ways for both areas. First the FQI was calculated using all species at the site, including planted species. The FQI was also calculated without including planted species (spontaneous natives only). Area A had an FQI of 5.1 and a mean C value of 1.4. None of the species in the original emergent planting were found at this site. Area B had an FQI of 11.3 and a mean C value of 1.9 when planted material was included. These values dropped to 8.0 (FQI) and 1.5 (mean C) when planted species were excluded. These values are indicative of areas with poor natural quality. There were a total of 14 native species (88%) found in Area A. Area B had a total of 34 native species (79%) in 2002, down 9 from 2001 (Marcum *et al.* 2001). Notable additions include *Apocynum sibiricum*, *Asclepias incarnata*, and *Polygonum amphibium*. Summary information for Area A and B is given in Tables 2 and 3.

**Project Goal #1** At the end of the five year monitoring period the created wetland community should be a jurisdictional wetland as defined by current federal standards.

### **Area A**

**Predominance of Hydrophytic Vegetation** – The performance criterion requires that greater than 50% of the dominant plant species be hydrophytic. Vegetation in Area A was not sampled in 2002 because of prolonged flooding. As a result of this long term flood event, most plants that were present on the site in 2001 were killed. Therefore, Area A had no dominant vegetation. This site does not meet the criterion for predominance of hydrophytic vegetation for the 2002

growing season. However, in our opinion, this site will have dominant hydrophytic vegetation under normal circumstances. Unusual circumstances, related to prolonged flooding, are described in more detail in the wetland hydrology section below.

<b>Table 2. Summary table for Area A species list.</b>	
Total Species Richness	16
Native Species Richness	14
% Adventive	13% (2/16)
% Weedy	75% (12/16)
Mean Conservatism	1.4
Floristic Quality Index (FQI)	5.1
% Wetland Species (OBL, FACW, FAC)	88% (14/16)

B. Presence of Hydric Soils – The performance criterion requires that hydric soil characteristics be present, or conditions favorable for hydric soil formation should persist. Soil development is underway on this excavated site. There is distinct soil development and weak horizonation noticeable within the stratum. The colors observed, while still partially relic, are forming prominent hydric features. Based on this year's observations, hydric soils have developed and should continue to be hydric if the hydrology continues. Sedimentation was very apparent on Area A this year. There was between 0.01 to 0.05 m (0.5 to 2 in) of silty soil material atop the old surface. While sedimentation is a natural occurrence in wetlands on floodplains, if this rate of sedimentation were to continue every year it could eventually fill in this lower excavated site. Tables 5 provides details on features of the soils at Area A.

**Table 5. Description of the soils at the created wetland Area A.**

Depth(in)	Matrix Color	Concentrations	Depletions	Texture	Structure
+2-0	10YR 2/1			Silt	Massive
0-9	10YR 3/1	10YR 5/8		Silt Clay Loam	Granular
9-18	10YR 4/1 & 10YR 3/1	10YR 4/6		Silty Clay Loam	Sub-Blocky

C. Presence of Wetland Hydrology – The performance criterion requires that the compensation area must be either permanently or periodically inundated at average depths less than 2m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season (Environmental Laboratory 1987). The ISGS initiated water level monitoring at this site in September 2001. Their findings for 2002 indicate that the entire 1.0 ha (2.4 ac) area conclusively satisfied the wetland hydrology criterion (Pociask and Sabatini 2002).

During visits to the site, the following indicators of wetland hydrology were present in Area A: inundation over much of the site even into September, sediment deposits, drift lines, presence of large woody debris, algal mats and mud cracks. Unusual circumstances affected the hydrology of the site during 2002. Floodwater from the Sangamon River overtopped the levee and drift was deposited as high as the access road to the east of Area A (Photo 7 of Appendix 2). A water control valve located in the south part of the levee surrounding the mitigation area was closed

prior to this late spring flooding. Therefore, water was artificially trapped on the site for a very long duration of the 2002 growing season. Apparently the farmer who owns the adjacent property dug a hole through the levee wall allowing his field to drain for a late planting of soybeans (Photo 8 of Appendix 2). The hydrologic data for this year is not typical of the normal circumstances present at the site. ISGS monitoring well data in the coming years will be needed to make a conclusive determination and to establish extent of wetland hydrology.

## Area B

A. **Predominance of Hydrophytic Vegetation** – The performance criterion requires that greater than 50% of the dominant plant species be hydrophytic. Results for 2002 indicate that the dominant herbaceous species in Area B are *Amaranthus tuberculatus* (OBL), *Echinochloa muricata* (OBL), and *Panicum dichotomiflorum* (FACW-). The shrub layer dominants are four of the five planted tree species: *Betula nigra* (FACW), *Carya illinoensis* (FACW), *Quercus bicolor* (FACW+) and *Quercus palustris* (FACW). More than 50% (100%) of the dominant plant species are hydrophytic (planted species were not included in the calculation of percent hydrophytic vegetation). This site meets the criterion for predominance of hydrophytic vegetation.

**Table 3. Summary table for Area B species list.**

Total Species Richness	43
Native Species Richness	34
% Adventive	21% (9/43)
Mean Conservatism (with planted material)	1.9
Mean Conservatism (spontaneous natives only)	1.5
Floristic Quality Index (FQI) (with planted material)	11.3
FQI (spontaneous natives only)	8.0
% Wetland Species (OBL, FACW, FAC) (with planted material)	81% (35/43)
% Wetland Species (OBL, FACW, FAC) ( w/o planted material)	79% (30/38)

B. **Presence of Hydric Soils** – The performance criterion requires that hydric soil characteristics be present, or conditions favorable for hydric soil formation should persist. Soil development is underway on this two part excavated site. There is distinct soil development and weak horizonation noticeable within the stratum. The colors observed, while still partially relic, have formed prominent hydric features. Given this year's observations, hydric soils have developed and should continue to be hydric if the hydrology continues. Table 6 provides details on features of the soil at Area B.

**Table 6. Description of the soils at the created wetland Area B.**

Depth(in)	Matrix Color	Concentrations	Depletions	Texture	Structure
0-2	10YR 3/1			Silt Loam	Granular
2-4	10YR 3/1	10YR 5/8 cfp		Silt Clay Loam	Sub-Blocky
4-18	10YR 3/1 & 2.5Y 6/2	5YR 3/4 & 7.5YR 5/8		Silty Clay Loam	Sub-Blocky
18-24	10YR 3/1	10YR 5/8		Silty Clay Loam	Sub-Blocky

C. Presence of Wetland Hydrology – The performance criterion requires that the compensation area must be either permanently or periodically inundated at average depths less than 2m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season. The ISGS initiated water level monitoring at this site in September 2000. Their findings for 2002 indicate that the entire 1.20 ha (3.00 ac) area conclusively satisfied the wetland hydrology criterion (Pociask and Sabatini 2002). This is up from 0.17 ha (0.41 ac) in 2001 (Pociask and Watson 2001).

During visits to the site, the following indicators of hydrology were present in Area B: large woody debris, drift lines, algal mats, mud cracks, and some areas of surface or near surface saturation. In addition, there was a small depressional area that was inundated as late as September. Because of the unusual circumstances affecting hydrology of this area, extent of wetland hydrology under normal circumstances would surely be much lower. Some areas within the site are at a higher landscape position and may not have wetland hydrology under normal circumstances. ISGS monitoring well data in the coming years will be needed to make a conclusive determination and to establish extent of the nonwetland area.



**Figure 1. 2002 aerial extent of wetland hydrology for Area and Area B (from ISGS, Pociask and Sabatini 2002).**

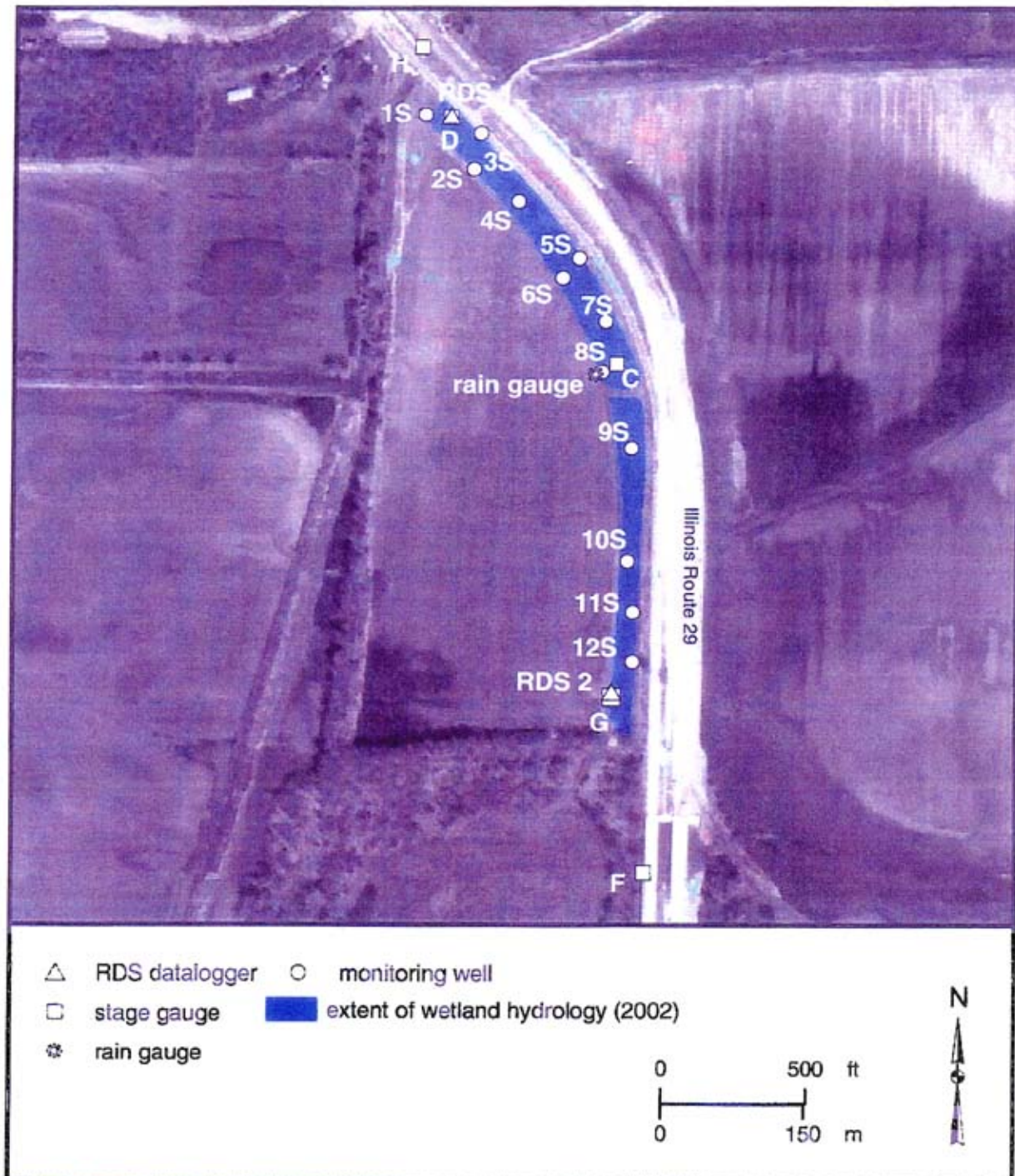


Figure prepared by ISGS.

**Project Goal #2:** In Area B, a floodplain forest wetland community will be created.

All planted trees within Area B were located, identified and their condition was assessed. A total of 416 trees were found alive in 2002. A total of 155 trees, including 86 *Fraxinus pennsylvanica*, had died during the time between the 2001 and 2002 tree monitoring. In 2002, tree survival fell below the 75% survivorship requirement with 72.9% (416/571) alive. *Quercus palustris* remained at its 2001 level with 95% survival. All other tree species showed significant mortality. Table 7 shows the cumulative survivorship for each tree species planted in Area B.

**Table 7. Cumulative tree survival for Area B – 2000 to 2002.**

Species	# Alive	# Dead	Total Planted	% Survival
<i>Betula nigra</i>	98	12	110	89.1
<i>Carya illinoensis</i>	95	19	114	83.3
<i>Fraxinus pennsylvanica</i>	29	86	115	25.2
<i>Quercus bicolor</i>	81	32	113	71.7
<i>Quercus palustris</i>	113	6	119	95.0
Totals	416	155	571	72.9

**Project Goal #3:** In Area A, a native, non-weedy, emergent wetland community will be created.

In Area A, many weedy and non-native species were present during the first year of sampling (Marcum *et al.* 2001). Twenty-three of the forty-one species (56%) found at this site were either non-native or weedy species. During the 2002 survey of Area A very little vegetation was observed on the site and there were no dominant species present. Much of the vegetation, including all the planted emergents, was killed by artificially prolonged flooding. The plant species that were present consisted of early successional native weedy species. Twelve of the sixteen species (75%) found at this site in 2002 were either non-native or weedy species.

### Summary and Recommendations

**Floristic Quality Index** – Prolonged flooding had a great impact on both sites, although much more dramatic in Area A. Total species richness dropped from 41 to 16 in Area A and from 62 to 43 in Area B. While both sites showed significant decreases in species richness, the Floristic Quality Index of Area B increased since the 2001 monitoring. The FQI, however, remains very low for both sites. For 2002, Area A had an FQI of 5.1 and Area B had an FQI of 11.3 (8.0 without planted material). Tables 8 and 9 show summary statistics for both wetland sites from the onset of monitoring.

Prolonged flooding, such as was seen at these sites in 2002, is not the normal circumstance. Under normal flooding regimes these sites should continue to develop into the predicted wetland communities with greater diversity than is now apparent. However, because of the dramatic setback in Area A, we suggest replanting with emergent hydrophytes to speed its recovery and to insure a higher quality wetland. The previously planted emergents, *Asclepias incarnata*, *Leersia oryzoides*, and *Spartina pectinata*, were doing well prior to 2002 and would be expected to do

well at this site if replanted. Other emergents that could be planted in Area A include: *Bidens cernua*, *Iris shrevei*, and *Sagittaria latifolia*.

*Phalaris arundinacea* continues to be present at Area B. At this point, *Phalaris* is not a problem and the abundance of this aggressive, persistent weed will continue to be monitored.

**Table 8. Summary Table for Area A, 2000 to 2002.**

	2000*	2001	2002♣
Total Species Richness	-----	41	16
Native Species Richness	-----	34	14
% Adventive	-----	17	13
% Weedy	-----	56	75
Mean Conservatism (w/planted material)	-----	1.8	1.4
Mean Conservatism (w/o planted material)	-----	1.6	1.4
Floristic Quality Index (FQI) (w/planted material)	-----	10.5	5.1
FQI (w/o planted material)	-----	9.0	5.1
% Wetland Species (OBL, FACW, FAC) (w/planted material)	-----	83	88
% Wetland Species (OBL, FACW, FAC) (w/o planted material)	-----	82	88

\*Area A was not monitored until 2001

♣all planted material was killed by prolonged flooding

**Table 9. Summary Table for Area B, 2000 to 2002.**

	2000*	2001♣	2002
Total Species Richness	50	62	43
Native Species Richness	30	43	34
% Adventive	40	31	21
Mean Conservatism (w/planted material)	1.77	1.6	1.9
Mean Conservatism (w/o planted material)	1.08	1.2	1.5
Floristic Quality Index (FQI) (w/planted material)	9.68	10.4	11.3
FQI (w/o planted material)	5.31	7.3	8.0
% Wetland Species (OBL, FACW, FAC) (w/planted material)	54	60	81
% Wetland Species (OBL, FACW, FAC) (w/o planted material)	52	56	79

\*Marcum et al. 2000, ♣ Marcum et al. 2001

**Project Goal # 1** – The performance criterion requires that greater than 50% of the dominant plant species be hydrophytic, that hydric soil characteristics be present, or conditions favorable for hydric soil formation should persist, and that the compensation area must be either permanently or periodically inundated at average depths less than 2m (6.6 ft) or have soils that are saturated to the surface for at least 12.5% of the growing season. Unusually long term flooding in 2002 had a dramatic affect on both sites. The vegetation in Area B satisfies the performance criterion for project goal #1. Likewise, in our opinion, Area A will also have dominant hydrophytic vegetation under normal circumstances. Hydric soils continue to develop at both sites as prominent hydric features (low chroma matrix and redox features) are forming.

Hydrology at these sites, however, has been very inconsistent from year to year. This year, especially, had unusual hydrologic circumstances. Artificially prolonged flooding, caused by a closed water control valve in the south levee, drastically affected both sites. The hydrologic data for 2002 suggests that the entire 2.20 ha (5.40 ac) area has wetland hydrology. Future data on hydrology of these sites will be needed to accurately determine the extent of wetland hydrology and the extent of wetland area.

**Project Goal # 2** – The performance criterion requires that seventy-five percent of the planted trees should be in a live and healthy condition each year for five years. The performance criterion for this project goal was easily attained during the first two years of monitoring. In 2000 over 97% of the planted trees survived. Some replanting was done in 2001 and tree survival remained very high at 96.5% overall. During 2002 a prolonged flood event occurred and many of the planted trees were killed. Survival fell to 72.9%, just below the performance criterion of 75%. Considering the severity and length of flooding on this site in 2002, this value is higher than might be expected. The large, more mature size of the tree plantings is probably the reason for their great success.

*Quercus palustris* (95.0%), *Betula nigra* (89.1%), and *Carya illinoensis* (83.3%) fared best and remain at acceptable levels. *Quercus bicolor* (71.7%) and especially *Fraxinus pennsylvanica* (25.2%) showed significant decline. We suggest replanting up to 155 trees at this site to satisfy the stated performance criterion.

**Project Goal #3** – The performance criterion requires that, in Area A, at least 90% of the plant species present should be non-weedy, native, perennial and annual species, and none of the dominant plant species may be non-native or weedy species, such as cattails, sandbar willow or reed canary grass. In 2002, no dominant vegetation was present in Area A due to prolonged flooding. Species richness was drastically reduced and the species that remained were in large part weedy species, adapted to disturbance situations. At this time, 75% (12/16) of the species in Area A are considered weedy. This area has returned to virtually bare ground and must be replanted with high quality emergents if the performance criterion for project goal #3 is to be attained.

Also stated in the performance criterion, none of the dominant species may be non-native or weedy. Currently at Area A, there is no dominant vegetation present because of the abundance of bare ground. It is estimated that greater than 90% of the site is bare ground. Replanting of this site with high quality emergents needs to take place before invasive species, like *Phalaris arundinacea*, are able to take hold.

At this time, the actual area of these wetlands cannot be determined. More monitoring of this site and better information about the hydrology will determine the presence and extent of these created wetlands. However, according to the ISGS, the total area of the excavation is less than required 6.0 acres (Pociask and Sabatini 2002).

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## **Appendix 1. Wetland Determination Forms**

## ROUTINE ON-SITE WETLAND DETERMINATION

Area A (page 1 of 3)

**Field Investigators:** Marcum, Kurylo, & Larimore

**Date:** 20 August, 1 October, and 4 October 2002    **Project Name:** FAP 658 (IL 29)

**State:** Illinois

**County:** Sangamon

**Site Name:** Wet Meadow

**Legal Description:** E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.

**Location:** The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft) where it meets Area B.

Do normal environmental conditions exist at this site?                      Yes: X    No:

Has the vegetation, soils, or hydrology been significantly disturbed?    Yes: X\*    No:

*\* This site is a recently excavated depression, created for mitigation purposes. Also in 2002, the levee was overtopped and water remained on this site for a very long duration. As a result, most of the vegetation in Area A was killed.*

### VEGETATION

<b>Dominant Plant Species</b>	<b>Indicator Status</b>	<b>Stratum</b>
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No dominant vegetation due to prolonged flood event in 2002.

Percentage of dominant species that are OBL, FACW, FAC+, or FAC: 0%

**Hydrophytic vegetation:** Yes: X                      No:

**Rationale:** Less than 50% of the dominants in 2002 are OBL, FACW, FAC+, or FAC. However, unusual circumstances existed at this site in 2002. The water control structure in the levee surrounding this site was closed and water remained ponded on the site for a significant portion of the growing season. Under normal circumstances, this water would have drained back to the Sangamon River allowing emergent vegetation to grow.

### SOILS

Series and phase: NRCS mapped as Radford and Sawmill, revised to generic Mollic Endoaquent.

On county hydric soils list?                      Yes:                      No: X

Is the soil a histosol?                              Yes:                      No: X

Histic epipedon present?                          Yes:                      No: X

Redox Concentrations?                          Yes: X                      No:                      Color: 10YR 4/6 and 5/8

Redox Depletions?                                  Yes:                      No: X

Matrix color:                      10YR 3/1 over 10YR 4/1 mixed with 10YR 3/1

Other indicators: None.

**Hydric soils?** Yes: X                      No:

**Rationale:** This site is an excavated depression built for the purpose of mitigation. Although the top layers were removed exposing a poorly drained substratum, pedogenic processes have taken hold and the soil is developing its own hydric characteristics. This soil meets the F3 and F6 indicators form NRCS.



**ROUTINE ON-SITE WETLAND DETERMINATION**  
Area A (page 2 of 3)

**Field Investigators:** Marcum, Kurylo, & Larimore

**Date:** 20 August, 1 October, and 4 October 2002    **Project Name:** FAP 658 (IL 29)

**State:** Illinois

**County:** Sangamon

**Site Name:** Wet Meadow

**Legal Description:** E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.

**Location:** The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft) where it meets Area B.

**HYDROLOGY**

Inundated:    Yes: X    No:    Depth of standing water: 0 – 0.46 m (0 - 1.5 ft) on August visit  
Depth to saturated soil: saturated to the surface.

Overview of hydrological flow through the system: This site receives water through precipitation, sheetflow from adjacent higher ground, and from flood events of the Sangamon River. In 2002, flood waters from the Sangamon River overtopped the levee surrounding this site. Water leaves the site via evapotranspiration, groundwater recharge, and normally through a water control structure in the levee at the southern end of the site. This water control structure was closed when the site became flooded and water was trapped on the site for an unusually long duration.

Size of watershed: Approximately 3885 km<sup>2</sup> (1500 mi<sup>2</sup>) (Wicker *et al.* 1997).

Other field evidence observed: This site has been excavated to hold water for longer periods. Much of the site was inundated as late as September. Sediment deposits, drift lines, large debris (trees), algal mats, mud cracks, and areas of soil saturation were observed at this site.

**Wetland hydrology:** Yes: X    No:

**Rationale:** Field observations suggest that this entire site satisfied the wetland hydrology criterion in 2002. However, unusual circumstances (mentioned previously) existed at this site in 2002. At the end of the five year monitoring period a conclusive area will be determined that exhibits wetland hydrology.

**DETERMINATION AND RATIONALE:**

**Is the site a wetland?**  
**Rationale for decision:**

Yes:    No:    Undetermined: X  
Hydric soils are developing at the site and dominant hydrophytic vegetation would be present under normal circumstances. However, the extent of wetland hydrology at this site has been too variable and artificial to make an accurate decision. It is our opinion, that under normal circumstance much of this site would exhibit wetland hydrology. The status of this site is undetermined until more data is collected to substantiate extent of wetland hydrology.

## ROUTINE ON-SITE WETLAND DETERMINATION

Area A (page 3 of 3)

**Field Investigators:** Marcum, Kurylo, & Larimore

**Date:** 20 August, 1 October, and 4 October 2002 **Project Name:** FAP 658 (IL 29)

**State:** Illinois

**County:** Sangamon

**Site Name:** Wet Meadow

**Legal Description:** E1/2 of NE1/4 of SW1/4, Sect. 33, T.17 N., R.5 W.

**Location:** The site is located immediately west of the new Illinois Route 29 embankment and begins approximately 488 m (1600 ft) north of the Sangamon River. This site continues north for approximately 427 m (1400 ft) where it meets Area B.

### SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
<i>Amaranthus tuberculatus</i>	tall waterhemp	herb	OBL	1
<i>Ammannia coccinea</i>	long-leaved ammannia	herb	OBL	5
<i>Bidens frondosa</i>	common beggar's ticks	herb	FACW	1
<i>Calystegia sepium</i>	American bindweed	herb	FAC	1
<i>Campsis radicans</i>	trumpet creeper	herb	FAC	2
<i>Chamaesyce humistrata</i>	milk spurge	herb	FACW	1
<i>Cyperus esculentus</i>	yellow nut-sedge	herb	FACW	0
<i>Echinochloa muricata</i>	barnyard grass	herb	OBL	0
<i>Eclipta prostrata</i>	yerba de tajo	herb	FACW	2
<i>Ipomoea lacunosa</i>	small white morning-glory	herb	FACW	1
<i>Polygonum lapathifolium</i>	curttop lady's thumb	herb	FACW+	0
<i>Polygonum pensylvanicum</i>	giant smartweed	herb	FACW+	1
<i>Portulaca oleracea</i>	purslane	herb	FAC-	*
<i>Rorippa islandica</i>	marsh yellow cress	herb	OBL	4
<i>Sida spinosa</i>	prickly sida	herb	FACU	*
<i>Xanthium strumarium</i>	cocklebur	herb	FAC	0

♦ Coefficient of Conservatism (Taft *et al.* 1997)

mean C value (mCv) =  $\sum C/N = 19/14 = 1.4$

\*Non-native species FQI = mCv ( $\sqrt{N}$ ) = 1.4 ( $\sqrt{14}$ ) = 5.1

Determined by: Paul Marcum & Rick Larimore (vegetation and hydrology)  
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# **ROUTINE ON-SITE WETLAND DETERMINATION** Area B (page 1 of 4)

**Field Investigators:** Marcum, Kurylo, & Larimore

**Date:** 20 August, 1 October, and 4 October 2002

**State:** Illinois

**Site Name:** Wet Shrubland/Meadow

**Legal Description:** S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.

**Location:** The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

**Project Name:** FAP 658 (IL 29)  
**County:** Sangamon

Do normal environmental conditions exist at this site? Yes: X No:

Has the vegetation, soils, or hydrology been significantly disturbed? Yes: X\* No:

\* This site is a recently excavated depression, created for mitigation purposes.

## **VEGETATION**

Dominant Plant Species	Indicator Status	Stratum
1. <i>Betula nigra</i>	planted	shrub
2. <i>Carya illinoensis</i>	planted	shrub
3. <i>Quercus bicolor</i>	planted	shrub
4. <i>Quercus palustris</i>	planted	shrub
5. <i>Amaranthus tuberculatus</i>	OBL	herb
6. <i>Echinochloa muricata</i>	OBL	herb
7. <i>Panicum dichotomiflorum</i>	FACW-	herb

Percentage of dominant species that are OBL, FACW, FAC+, or FAC: 100%

**Hydrophytic vegetation:** Yes: X No:

**Rationale:** More than 50% of the dominants are OBL, FACW, FAC+, or FAC.

## **SOILS**

Series and phase: NRCS mapped as Radford and Sawmill, revised to generic Mollic Endoaquent.

On county hydric soils list? Yes: No: X

Is the soil a histosol? Yes: No: X

Histic epipedon present? Yes: No: X

Redox Concentrations? Yes: X No: Color: 7.5YR 5/8 and 5YR 3/4

Redox Depletions? Yes: No: X

Matrix color: 10YR 3/1 over 10YR 3/1 mixed with 2.5YR 6/2

Other indicators: None.

**Hydric soils?** Yes: X No:

**Rationale:** This site is an excavated depression, built for the purpose of mitigation. The top layers of soil had been removed leaving a poorly drained substratum with little or no soil development at the surface. Over the past year though, new soils have begun to develop and hydric features (low chroma matrix and redox features) are now very evident within the profile. This soil also meets the NRCS hydric soil indicator of F3.

## ROUTINE ON-SITE WETLAND DETERMINATION

Area B (page 2 of 4)

**Field Investigators:** Marcum, Kurylo, & Larimore

**Date:** 20 August, 1 October, and 4 October 2002

**State:** Illinois

**Site Name:** Wet Shrubland/Meadow

**Legal Description:** S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.

**Location:** The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

**Project Name:** FAP 658 (IL 29)

**County:** Sangamon

### HYDROLOGY

Inundated: Yes: X (only in one depression) No: X Depth of standing water: 0-0.1 m (0-0.3 ft)  
Depth to saturated soil: 0 to >0.66 m (0 to >26 in)

Overview of hydrological flow through the system: This site receives water through precipitation, sheetflow from adjacent higher ground and from flood events of the Sangamon River. Water leaves the site via evapotranspiration, groundwater recharge, and through sheetflow between this site and Area A.

Size of watershed: Approximately 3885 km<sup>2</sup> (1500 mi<sup>2</sup>) (Wicker *et al.* 1997).

Other field evidence observed: This site has been excavated to hold water for longer periods. Algal mats, mud cracks, drift lines, and areas of soil saturation were observed at this site. The ISGS hydrology data for 2002 suggests that the entire 1.20 ha (3.00 ac) excavation satisfied the wetland hydrology criterion (Pociask and Sabatini 2002). This is up from 0.17 ha (0.41 ac) in 2001 (Pociask and Watson 2001).

**Wetland hydrology:** Yes: X No:

**Rationale:** Field observations suggest that this entire site satisfied the wetland hydrology criterion in 2002. However, unusual circumstances (mentioned previously) existed at this site in 2002. At the end of the five year monitoring period a conclusive area will be determined that exhibits wetland hydrology.

### DETERMINATION AND RATIONALE:

**Is the site a wetland?**

**Rationale for decision:**

Yes: No: Undetermined: X

Hydric soils are developing at the site and dominant hydrophytic vegetation is present. However, the extent of wetland hydrology at this site has been too variable and artificial to make an accurate decision. It is our opinion, that under normal circumstance much of this site would exhibit wetland hydrology. The status of this site is undetermined until more data is collected to substantiate extent of wetland hydrology.

# ROUTINE ON-SITE WETLAND DETERMINATION

Area B (page 3 of 4)

**Field Investigators:** Marcum, Kurylo, & Larimore

**Date:** 20 August, 1 October, and 4 October 2002

**State:** Illinois

**Site Name:** Wet Shrubland/Meadow

**Project Name:** FAP 658 (IL 29)

**County:** Sangamon

**Legal Description:** S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.

**Location:** The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

## SPECIES LIST

Scientific name	Common name	Stratum	Wetland indicator status	C♦
<i>Abutilon theophrasti</i>	velvet-leaf	herb	FACU-	*
<i>Amaranthus tuberculatus</i>	tall waterhemp	herb	OBL	1
<i>Ambrosia artemisiifolia</i>	common ragweed	herb	FACU	0
<i>Ammannia coccinea</i>	long-leaved ammannia	herb	OBL	5
<i>Apocynum cannabinum</i>	dogbane	herb	FAC	2
<i>Apocynum sibiricum</i>	Indian hemp	herb	FAC+	2
<i>Asclepias incarnata</i>	swamp milkweed	herb	OBL	4
<i>Aster simplex</i>	panicled aster	herb	FACW	3
♣ <i>Betula nigra</i>	river birch	shrub	FACW	4
<i>Bidens vulgata</i>	tall beggar's ticks	herb	FACW	0
<i>Calystegia sepium</i>	American bindweed	herb	FAC	1
<i>Campsis radicans</i>	trumpet creeper	herb	FAC	2
♣ <i>Carya illinoensis</i>	pecan	shrub	FACW	6
<i>Cassia fasciculata</i>	partridge pea	herb	FACU-	1
<i>Chamaesyce humistrata</i>	milk spurge	herb	FACW	1
<i>Cyperus esculentus</i>	yellow nut-sedge	herb	FACW	0
<i>Cyperus strigosus</i>	straw-colored flatsedge	herb	FACW	0
<i>Digitaria sanguinalis</i>	hairy crab grass	herb	FACU	*
<i>Echinochloa muricata</i>	barnyard grass	herb	OBL	0
<i>Eragrostis</i> sp.	lovegrass	herb	----	--
♣ <i>Fraxinus pennsylvanica</i>	green ash	shrub	FACW	2
<i>Ipomoea hederacea</i>	ivy-leaved morning glory	herb	FAC	*
<i>Ipomoea lacunosa</i>	small white morning-glory	herb	FACW	1
<i>Leucospora multifida</i>	Obe-wan-conobea	herb	FACW+	3
<i>Mollugo verticillata</i>	carpetweed	herb	FAC	*
<i>Panicum capillare</i>	witch grass	herb	FAC	0
<i>Panicum dichotomiflorum</i>	fall panicum	herb	FACW-	0
<i>Panicum virgatum</i>	prairie switchgrass	herb	FAC+	4
<i>Phalaris arundinacea</i>	reed canary grass	herb	FACW+	*
<i>Polygonum amphibium</i>	water smartweed	herb	OBL	3

Species list continued on following page.

# ROUTINE ON-SITE WETLAND DETERMINATION

Area B (page 4 of 4)

**Field Investigators:** Marcum, Kurylo, & Larimore

**Date:** 20 August, 1 October, and 4 October 2002

**State:** Illinois

**Site Name:** Wet Shrubland/Meadow

**Project Name:** FAP 658 (IL 29)

**County:** Sangamon

**Legal Description:** S1/2 of SE1/4 of NW1/4, Sect. 33, T.17 N., R.5 W. and NW1/4 of SE1/4 of NW1/4, Sect. 33, T. 17 N., R. 5 W.

**Location:** The site is located immediately west of the new Illinois Route 29 embankment and approximately 975 m (3200 ft) north of the Sangamon River.

## SPECIES LIST (continued)

Scientific name	Common name	Stratum	Wetland indicator status	C♦
<i>Polygonum lapathifolium</i>	curttop lady's thumb	herb	FACW+	0
<i>Polygonum pensylvanicum</i>	giant smartweed	herb	FACW+	1
<i>Populus deltoides</i>	eastern cottonwood	herb	FAC+	2
<i>Portulaca oleracea</i>	purslane	herb	FAC-	*
♣ <i>Quercus bicolor</i>	swamp white oak	shrub	FACW+	7
♣ <i>Quercus palustris</i>	pin oak	shrub	FACW	4
<i>Rorippa islandica</i>	marsh yellow cress	herb	OBL	4
<i>Setaria faberi</i>	giant foxtail	herb	FACU+	*
<i>Setaria glauca</i>	pigeon grass	herb	FAC	*
<i>Sida spinosa</i>	prickly sida	herb	FACU	*
<i>Solanum carolinense</i>	horse nettle	herb	FACU-	0
<i>Toxicodendron radicans</i>	poison ivy	herb	FAC+	1
<i>Vitis riparia</i>	riverbank grape	herb	FACW-	2
<i>Xanthium strumarium</i>	cocklebur	herb	FAC	0

♦ Coefficient of Conservatism (Taft *et al.* 1997)

\*Non-native species

♣ planted

with planted material

mean C value (mCv) =  $\sum C/N = 66/34 = 1.9$

FQI = mCv ( $\sqrt{N}$ ) =  $1.9(\sqrt{34}) = 11.3$

without planted material

mean C value (mCv) =  $\sum C/N = 43/29 = 1.5$

FQI = mCv ( $\sqrt{N}$ ) =  $1.5(\sqrt{29}) = 8.0$

Determined by: Paul Marcum & Rick Larimore (vegetation and hydrology)  
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## **Appendix 2. Photos of wetland creation sites**



**Photo 1. View from south end of Area A, looking due north.**





**Photo 2. View from north end of Area A, looking due south.**



**Photo 3. View from the northeast corner of Area A, looking south.**



**Photo 4. View from the north end of Area B, looking due south.**





**Photo 5. View from the northeast corner of Area B, looking south.**



**Photo 6. View from the eastside center of Area B, looking south.**



**Photo 7. Drift deposited on the access road east of Area A.**





**Photo 8. Hole dug through the levee wall southeast of Area A.**